

European Approaches on the Concept of Lean Management

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Abstract

All aspects of Lean Management presented in this paper have attempted to show the size of an approach of the industrial performance in European companies. The myth created by the results in Japanese car companies Toyota has attracted the interest of many authors to this management system. In this paper, we propose to make a presentation of the contributions in the field, some of them, but also why the system was met with reluctance in this part of the world.

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1. The main concepts of Lean Management

Lean Management is a production model presented by J. Wormack and D. Jones to describe the plants manufacture Toyota (Toyota Production Systems-TPS).

Lean is above all an approach whose objective is to understand and accept the need for systematic elimination of losses and of the use of the JIT (Just In Time) benefits (Badea,2009), (Deac et al., 2010), (Ionescu&Păunescu, 2001).

This model allows the benefits of adding methods of organizing mass production (low cost) and series production (flexibility and improved quality). From this standpoint, JIT has become the central ingredient of the success of Toyota plants in the 1970s.

Progressively, this method of losses disposal by reducing inventories, was taken by many car manufacturers, so that in 1990 the practice has spread worldwide. In this way, the method Lean allowed the aggregation benefits related to the continuous improvement (eliminating losses, increasing productivity and quality, reduce inventory levels and optimizing the means of production) with the

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enterprise responsiveness, or in other words, its ability to constantly reconfigure its operational processes.

Experience car companies, services, cosmetics etc. shows that the Lean model refers to two types of improvements, which directly concern the industrial production assets.

The first type targets the execution capacity of many varieties of products in small quantities and at costs close to those of mass production. It comes as industrial machinery to work at a speed that allows them to adapt to changes in product demand, or in other words, it is JIT. The success of such an approach must always be considered as a result of an overall plan for continuous improvement.

The second type of improvement refers to a quick setup of enterprise organization, as this to best answer the change of the product requests.

It follows that, in order to respond to requests for products becoming more diverse, less expensive and more reliable, this production model is based on a simple concept to production management, applied in 1980, the JIT concept. This concept regards to all enterprise functions and allows parallel improvement of the cost, quality and delivery time's targets.

Evolution of the enterprise to Lean model often requires a profound transformation in its operation, starting with the tools of continuous improvement of performance and continuing to mobilize all stakeholders. It is to bring into discussion all the traditions inherited from mass production.

Once released into production, the lean model to be maintained by periodically diagnosis, whose results will be evaluated regularly.

Lean principles focus on the whole customer needs and eliminate inefficient activities that are not producing value. One of the important fundamentals of Lean model is given by eliminating losses, called Muda in Japanese. Muda is not just the losses, but includes everything that leads to increased costs without adding value to the customer. These losses take various forms, from the most obvious to the most subtle:

- Surplus production;
- Waiting time
- During transport
- Times of parts storage and handling;
- Poor preparation of production;
- Large stocks
- Unnecessary gestures and wastes.

After eliminating of the losses and focusing on the client, the third essential element of the Lean model is the continuous improvement, or Kaizen. Very often, it is found that quality improvement is very close of the activity of innovation in the enterprise, in order to obtain better competitiveness and add value to the customer.

Enterprises can make improvements using several techniques, among which the most common methods are Kanban, 5S and mapping of the value chain. This set is completed with a set of tools, such as: JIT, visual control tools, quick change batch, Six Sigma, batch flow production to customer order.

These methods and tools highlight two ways of achieving industrial performance: How to respond productively to customer demand (JIT) and how to reactivate and make responsible all the actors involved (Jidoka) (Nakla, 2009)

2. How to respond productively to customer demand for products

This approach assumes that the enterprise to execute the entire quantity of goods ordered at the time required by the client. This means that the enterprise to produce according to customer's consumption rate, takt time, and with a cycle time, lead time, reliable.

Takt time or the customer's consumption rate, metronome production, causes a large number of choices for the organization.

Example: For a production of 60 products per day and an 8-hour working regime, Takt time is 8 minutes, in other words, a product is made at an interval of 8 minutes.

This approach involves simple and rapid flows, a high reactivity, a small batch production, and logistics and a job placement which are perfectly adapted. This requires the use of following concepts:

- The notion of "narrow" or "restriction". In production, there is always a limiting resource flow of a technological line. This bottleneck must be identified and treated with extreme caution in relation to other production equipment. In reality it is difficult to determine the position of this resource because it can be influenced by the type of manufactured products, tuning parameters, experienced workers etc.

- Method SMED (Single Minute Exchange of Die), or change equipment in less than 10 minutes. This method involves limiting the number of operations that require the stop of the machines, by improving the operations of training and shackle them and to eliminate unnecessary adjustments.

- Location of equipment in order to accelerate and simplify the manufacturing flows. It is often preferred, an organization in the form of straight stream or U. The advantages of these forms of organization are mainly related to promote an evolution of multi-line flow and development of skills operators.

- Use continuous production flow for small batch sizes. It can be seen that the use of SMED method, in combination with the location of equipment, allows to obtain beneficial effects for small lots, too. Reduced distances between jobs allow an easy processing and manufacturing of small batches, in a manner of "flow". Location systems U-shaped jobs, used mostly in product assembly activities, are considering a large number of jobs, whose worker number may vary depending on the type of manufactured products, and according to the takt time. This will allow an easy adaptation to changes in product demand.

- An "interrupted flow" can be represented, on the contrary, as a stream, which implies a real production according with the real consumer demand and not according to expectations. Among the techniques used in this case, we mention Kanban system.

➤ Synchronized flow consists of ordering supplies from suppliers according with the order of use of resources acquired by the main stream of enterprise technology.

3. How to reactivate and make responsible all the actors involved

This approach is based on three simple ideas: view of random phenomena, stopping the production process at the time of problems and the separation of human activities from those of machines, thought that goes into work mode JIT. In this context, the machines will be able to detect anomalies in their operation and on and off automatically when detect an error. On this basis, a worker can work simultaneously on multiple machines, avoiding the execution of defective products and their passage to the next jobs. This supposes that the worker has a greater autonomy and responsibility based on a trusting climate promoted by the organization's leaders (Năstase, 2009).

In this perspective, companies use a variety of tools for continuous improvement of its economic performance, whose results can be represented by:

- Reducing inventories of raw materials, unfinished and finished goods production, but also the cost of scrapped products;
- Optimize consumption of raw materials, energy, water, fuel;
- Industrial asset management and cost reduction;
- Optimize production capacity utilization by reducing make ready, stop and wait times;
- Improved flexibility of production through rapid reconfiguration of production resources, in accordance with customer demand.

In fact this is the Kaizen principle used in production. Hence, Lean Management can be successfully used in other sectors, such as trade, development projects and programs, supplies, etc.. The starting point is the analysis of the methods of work, according to two directions:

- Decomposition of activities in elementary operations to highlight the sources of inefficiency and losses in order to improve ways of working;
- Participation of individuals to analyze their activity, and to define actions to improve their work.

This new model of action, currently evolving, overcomes the boundaries of the productive area and is open to exploring strategic options. In this case, companies can set the following objectives:

- Redefining value in customer's point of view, namely of meeting its expectations, which requires additional commitment and accountability for enterprise employees;
- Decrease activities that do not generate added value and optimization of industrial assets in order to increase their capacity, without resort to new industrial investment;
- Partnership with a limited number of suppliers, considered as basic partners in viewpoint of the quality standards of the enterprise;

Innovation process in the late twentieth century also included production management. Researchers in the field are largely agreed that the principles of mass production (founded by Ford) have reached obsolescence (Badea, 2009), (Ionescu&Păunescu, 2001), (Năstase, 2009).

Fundamental paper presenting the new production system is developed by J. Womack and the study team of Massachusetts Institute of Technology in the years 1985-1990, which describes the new type of production, fluent production (Lean Production). This type of production uses in Japanese companies, especially Toyota, fewer resources (reduced by about 50%), less labor, less time for product development, fewer inventories, less production space. But, profit is similar to that obtained in mass production, although production series are small (Womack & Jones, 2009).

In the authors' point of view, the fluent production is the third type of production after that individual and mass. Fluent production is a development of the concept of continuity to the series production, the novelty being given by the coordination of production batches. Fluent production changes the way work, responsibilities, professional careers, teamwork

The system was developed by Toyota in 1950 and was initially known as the "Toyota System".

In the postwar years, the company had modest financial resources. For example, in Western practice hundreds of presses were used for all of body parts, and the company's budget did not allow this. In this way, the West presses could remain unchanged after adjustment for months, while Toyota's presses to be changed after several hours.

In addition, regulation of mills in the West was performed by specialists, the workers being in this time free, while the Toyota workers have been trained to carry also out this operation.

Improving the change techniques of the moulds, Toyota has reduced the operation time from one day to three minutes. To do this, skilled labor was required and highly motivated have needed.

In another phase, teams of workers began to form, the tasks being awarded the team. Then, the teams have been specialized on technological stages or inter-stages, having tasks of processing, repair or clean installation. Meanwhile, workers were granted the right to stop the assembly line in case of problems, which does not happen in enterprises in Western countries.

In time, in this system, the suppliers have been also involved, the relations with them becoming closer. They do not have technical solutions required to achieve the delivered products, but the parameters that have to have products have been delivered them. In this way, one succeeded to establish a group of primary suppliers and started organizing a group of secondary suppliers to supply the primary providers. Coordination of internal working teams and primary providers began to realize with Kanban system, which allowed the achievement of the production just in time, JIT.

The development of streamlined production required nearly 20 years of work, its creator is considered the technical director at Toyota, Taiichi Ohno.

Complex training of staff was introduced in the design, too. Significant changes in relationships with vendors of automobiles were produced by developing its own distribution network, which created the possibility of direct connections with long-term customers. In this way, salespeople have become the "first stage" of the production, and after 1990 even customers have been involved in designing their own automobile. Efficiency of the fluent production is due to its increased flexibility, following the development of customer-producer-supplier chain. If, for mass and individual production, production process consists primarily of manufacturing and assembly activities, for series production, taking into account only those elements, it did not give satisfactory results. For this reason, the manufacturing process began to be seen as a broader concept that includes a succession of other different activities: marketing, procurement, fabrication, assembly, sales, where some changes are necessary to achieve fluency of the series production.

From an organizational perspective, the workers have to make a great number of activities, they being allowed to identify the origin of irregularities, their assessment and even the stop of the production. The most used instruments in these cases are:

- ◆ Kanban, a system for ordering, scheduling and monitoring of the production;
- ◆ Jidoka system, to stop production when a defect is discovered;
- ◆ -Andon visual control system consists of panels showing the key indicators of production, the idea that problems should be quickly resolved once detected.

4. Characteristics of the fluent production in various fields of the enterprise

4.1 Design

- To manage the projects, a project manager is, to which the responsibility for achieving it is assigned;
- The project manager sets up a team from the members of all departments of the company, which are subordinated during the project implementation;
- Intensive communication within the team, allowing the solving of the problems since their arrival;
- Parallel execution of activities within the department.

4.2 Supply

- Suppliers organized into hierarchical levels; each supplier made its own project, respecting the restrictions imposed by higher-order supplier.

- Relationships between suppliers are based on a contract, where they the basic rules are written for acceptance of orders, delivery deadlines and delivery of orders.
- Pricing-maker is made by the final producer, which then is split the parts. If the manufacturer fails to sell product at established price, they negotiate decreasing the price of some parts (value analysis).
- For the coming years manufacturer expects that suppliers to lower prices as a result of "learning curve". If they fail to learn from its work will loose, in time, the contractual collaboration. In terms of profits, manufacturers and suppliers cooperate for a period of 4-5 years, so both sides are satisfied. Between producer and supplier, costs are transparent, they collaborating for profit.
- Abandonment of a supplier, if the deadline is not meet, does not occur suddenly but is made to shrinking orders along with the acquisition of resources from another provider. This is because working with a supplier is considered as an investment already made and to be seen if he is to blame or are there objective reasons.

4.3 Sale

○ In comparison with Ford, where sales of the manufacturer products takes place in specialty shops, which are leased sales, in the fluent production, the producer has several sales channels for each of them offering different products. Sales shops of a channel have design and production specialists, who are in constant contact with both clients and product development service. Knowing the possibilities of each producer and the use of conceptual modules, allows the vendor to design a car with the general characteristics, and then, a custom will be designed within a few weeks. Sales activity is now the first link in the production chain, in comparison with case so far, when design activity occupied this place.

4.4 Financial Resources

- The action is different in fluent production, compared to Western system. Enterprises with fluent production are closed private companies, because only a small portion of the shares are found in the sales process.
- The cross purchase of shares between companies allows that a small percentage of stock ownership to be taken into consideration in management process.

4.5 Human Resources

- From the viewpoint of those resources, the progression system is very different. This does not occur based on age, but on solving problems.
- The staff of the enterprise is continuously rotated, starting with assembly work, continuing with the design, and ending with production and sales activity. The cycle repeats until the targeted person get a management position in a particular industry.

4.6 Strategy of the enterprise

Enterprise with fluent production adopt the strategy of internationalization of business because there are many advantages:

- Provides protection against trade barriers and currency swings;
- Enables obtaining increased production;
- Provides increased protection against market cycles.

In addition to these characteristics, fluent production is based on a set of principles that determine its superiority over all other methods used so far:

- Throughout the production flow there is a continuous flow of material, which causes a low level of intermediate stocks; a fully perfected logistics is necessary to it;
- Times the output due to accidental interruption of operation is greatly reduced, due to preventive maintenance actions (Total Productive Maintenance);
- It reduces the scraps, recondition and defects in production by activities of quality assurance (Total Quality Management);
- It uses intellectual potential of all persons involved, by customizing the quality on jobs;
- Supplier is completely subordinated to the manufacturer, which in turn assists him in making orders;
- Both the producer and the supplier have an exchange of information to learn together, strengthening their partnership;
- The manufacturer makes long-term decisions for its suppliers in the initial design phase;
- The provider assumes full responsibility for the incumbent in product development and is responsible for quality assurance;
- Supplier and manufacturer shall agree on a price guide on the market; it excludes the possibility of ongoing negotiations over prices, as happens routinely in Western companies;
- Sub-suppliers supply suppliers in accordance with their needs, and not in lots to be stored;
- Suppliers are involved in research groups.

Table 1: The main differences between mass production and production of fluent

MASS PRODUCTION	FLUENT PRODUCTION
Energy-intensive	Based on information
Standards	Customer Satisfaction
Stable product mix	Rapid change in product mix
Automation	Flexible
Individual companies enterprise networks	Hierarchical structure horizontal structures
Distinct compartments	Integrated sections
Interlocking	Autonomy
Specialty trades	Multi-specialty

MASS PRODUCTION	FLUENT PRODUCTION
Minimum Training	Continuous Training
Adversarial relationships between enterprises	Consultations between enterprises and long-term relationships
Government Control	Government provided information, facilities, coordination
Full-time jobs	Flexible schedule and part-time

5. What opponents say about Lean Production?

Since 1970, the system begins to be criticized. In 1976, a Japanese journalist, Satoshi Kamata, talks about his experience of six months, the Toyota plant in the work Toyota, the despair plant.

In France, Margaret Moreau, a specialist in occupational medicine came into disagreement with management of the company Peugeot, where he closely observed the effects of induced by the labor in Lean Production system (Bolle, 2010).

She noted that in the automotive industry it is considered that all energy costs correspond to an individual worker for 35 years, with a height of 1.75 m and weighing 65 kg, who has no medical restrictions and can move a speed of 4 km / h. Applying Lean Production System, the author believes that it will be an acceleration of the pace of work, bringing effects unbearable for workers.

In the French car companies, however, workers' average age exceeds 45 years. Work rules established are no longer correspond to an aging population, Bruno also thinks Lemerle, union delegate.

Conversely, for Daniel Marco, GeoLean consultant and general manager, who implemented Lean Production System in the industry, this problem is not generally valid because the productivity of this system is obtained by eliminating sources of losses, but not through an accelerated pace work.

Meanwhile, a study by researcher Antoine Valeyre, published in 2007, proves otherwise. In his comparison to the four forms of work organization, he shows that in lean production the employees have as many chances to be confronted with "a lack of time to complete the work" as in traditional enterprises; in addition, they may have a chance to be subjected to high rates and deadlines "tight" always or almost always.

Another possible impact of Lean Production is the fact that it dramatically changes the working conditions. To eliminate sources of loss, Lean Production suggests avoiding unnecessary trips by rearranging production areas.

A side effect, after applying Lean Production is the muscle and bone injuries due to repeated gestures a lot, actually recognized occupational medicine. Proponents of the method explain the reflexes installed during the work processes and which improve the workers' movements, in their fight with these diseases work.

The positive effect of implementation of Lean Production is the increasing of the responsibility of individuals, and the main fault lies in the fact that Lean

Production is very rarely applied in its entirety. Alert principle, Andon, for the detection of defects is very difficult to enforce.

World number one, after 2009, the Japanese became a model. Lean production system is taught in major universities in the world, and applied in industry and services as a proof of relocation. Thousands of experts and consultants are password holders of the method.

But, Lean Production is very dangerous when it is not applied until the end. February 2010. Toyota recalls 3 million vehicles for damage to the brakes. Even at Toyota, the Lean motherland, there is a danger that it will lose the original spirit. To be effective, Lean Production should remain a method, not a religion.

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